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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/967,056

09/28/2001

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015685.P050

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04/19/2005

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EXAMINER

CHANG, EDITH M

ART UNIT

PAPER NUMBER

2637

DATE MAILED: 04/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/967,056

Applicant(s)

DOGAN ET AL.

Examiner

Edith M Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 19-27 and 31-48 is/are rejected.
- 7) ☒ Claim(s) 16-18 and 28-30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

Page 2, the last two lines are duplicated in the page 3 lines 1-2.

Page 15, the last line “S(t) is an element of S with index t, such that $0 \leq t \leq N-1$,” is not completed with a meaning.

Page 16, line 11 “S(t) is an element of S with index t, such that $0 \leq t \leq N-1$,” is not completed with a meaning.

Appropriate correction is required.

Claim Objections

2. Claims 1-30, 34-36 and 44-46 are objected to because of the following informalities:

Claim 1, lines 6 & 8: “the desired” is suggested changing to “the one desired”.

Claim 2, line 2: “a modified” is suggested changing to “the modified”.

Claim 3, line 1: “selecting” is suggested changing to “the selecting”.

Claims 7, 14, 20 & 26 lines 1 & 4, Claims 9, 11, 16, 18, 22, 24, 28 & 30 line 1: “modifying sequence” is suggested changing to “corresponding modifying sequence”.

Claim 7, line 2: “forming” is suggested changing to “the forming”.

Claim 9, line 2: “each complex number pair” is suggested changing to “each pair of equal complex numbers”; line 3: “complex number pair” is suggested changing to “pair of equal complex numbers”.

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Claim 12, line 1: “selecting” is suggested changing to “the selecting”.

Claim 14 line 2 & Claim 44 line 3: “a modified” is suggested changing to “the modified”.

Claim 16, line 2: “each phase shift pair” is suggested changing to “each pair of equal phase shifts”; line 3: “phase shift pair” is suggested changing to “pair of equal phase shifts”.

Claim 22, line 2: “each phase rotation pair” is suggested changing to “each pair of equal rotations”; line 3: “pair of rotations” is suggested changing to “pair of equal rotations”.

Claim 28, line 2: “each angle pair” is suggested changing to “each pair of equal angles”; line 3: “angle pair” is suggested changing to “pair of equal angles”.

Claim 34, line 5: “an original” is suggested changing to “the original”.

Claim 45, line 2: “selecting” is suggested changing to “ the selecting”.

Claims 4-6, 8, 10, 13, 15, 17, 19, 21, 23, 25, 27, 29, 35-36 and 46 are directly or indirectly dependent on the objected claims 1 and 34.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 34-39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with

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which it is most nearly connected, to make and/or use the invention. The claims 34 and 37 are single mean claims.

A single means claim, i.e., where a means recitation does not appear in combination with another recited element of means, is subject to an undue breadth rejection under 35 U.S.C. 112, first paragraph. In re Hyatt, 708 F.2d 712, 714-715, 218 USPQ 195, 197 (Fed. Cir. 1983) (A single means claim which covered every conceivable means for achieving the stated purpose was held nonenabling for the scope of the claim because the specification disclosed at most only those means known to the inventor.). When claims depend on a recited property, a fact situation comparable to Hyatt is possible, where the claim covers every conceivable structure (means) for achieving the stated property (result) while the specification discloses at most only those known to the inventor.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 6-12, 19-24, 31-42, and 47 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 line 3, Claims 8, 10, 15, 21, 23, 27 & 29 line 1: "the modulation format" lacks antecedent basis.

Claim 19, line 2: "the origin" lacks antecedent basis.

Claim 31, "A modified training sequence that exhibits at least one desired property..." does not clearly indicate what is the invention of this claim.

Claim 34, “An apparatus comprising: a data storage element having stored thereon symbols which represent a modified training sequence” is not a clear apparatus claim wherein the apparatus comprises a data storage having stored thereon symbols. This apparatus claim does not clearly indicate *the structure of the apparatus* regarding the invention.

Claims 36 & 39 lines 2-3 & Claim 42 line 3: “any other possible original training sequence” lacks antecedent basis.

Claim 37, “A base comprising: a demodulator using a peak to average power constrained modulation format to receive a modified training sequence” is not a clear apparatus claim wherein the base station comprises a demodulator. This apparatus claim does not clearly indicate *the structure of the base station* regarding the invention.

Claim 37, line 5: “the desired property of an original training sequence” lacks antecedent basis.

Claim 40, “Transmitting a modified training sequence using a peak to average power constrained modulation format, wherein the modified training sequence exhibits a desired property” is not a clear method claim wherein the step of transmitting a modified training sequence does not clearly indicate the invention subject matter of the method claim.

Claims 41 & 42, line 2: “the one desired property” lacks antecedent basis.

Claims 7-12, 20-24, 35-36, 38 and 47 are directly or indirectly dependent on the rejected claims 6, 19, 30, and 37.

Claim Rejections - 35 USC § 101

7. 35 U.S.C. 101 reads as follows:

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Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

8. Claims 31-33, 34-36, 37-39, 40-42 and 47 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

35 U.S.C. 101 defines four categories of inventions that Congress deemed to be appropriate subject matter of a patent; namely: processes, machines, manufactures and compositions of matter. The invention subject matter of claims 31, 34, 37 and 40 are directed to the modified training sequence which clearly does not fall into any of the four categories.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1, 4-8, 12-15, 19-21, 25-27 and 31-39 are rejected under 35 U.S.C. 102(e) as being anticipated by Tarokh et al. ("On the Computation and Reduction of the Peak-to-Average Power Ratio in Multicarrier Communications", IEEE TRANSACTIONS ON COMMUNICATION, VOL. 48, NO. 1, PP 37-44, January 2000).

Regarding claims 1, 4-5 & 7, In Fig.2, Tarokh et al. teaches a method of developing a modified wireless OFDM transmitted sequences (including training sequences) for reducing of the Peak-to-Average Power Ratio in multicarrier Communication (page 37 left column, lines 1-3 of section I. & the last paragraph of the left column to the right column line 7). In Fig.2 and

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equation (1) on page 38, the OFDM sequence is *selected* ($S(c,t)$) is the transmitted *original training sequence selected* corresponding to the code word c , page 38 right column lines 1-2), and modified by the corresponding Phase Shift (Fig.2, page 39 left column lines 9-20) wherein some Phase Shift sequences are shown on page 43 TABLE II/III (the Phase Shifts sequences are *corresponding modifying sequences*) to generate/*form* a modified sequence inputted to the Channel to transmit. It is well known that the wireless OFDM sequence for training the receiver having the properties of low (less a threshold) autocorrelation and cross-correlation (desired properties) for multicarrier RF communication.

Regarding **claims 2-3 & 44-48**, in Fig.2, Tarokh et al. teaches an apparatus and its method of computing and reduction of the Peak-to-Average Power Ratio (PAPR) in a OFDM (FDD) wireless communication (page 37 Abstract lines 10-19 & the first paragraph of I. INTRODUCTION).

In FIG.2, the Phase Shift modifies the OFDM sequence (Abstract lines 12-15, wherein the phase shift is introduced to each coordinate of all the codewords), and it is well known in the art that the sequence used in wireless OFDM is generate by appending prefix and suffix and cyclically delay/shift of the sequence.

Regarding **claim 6**, Tarokh et al. teaches the training sequences comprises a sequence of complex numbers corresponding to modulation scheme (page 38 equation (1), page 43 TABLE II/III & page 43 left column the last paragraph lines 1-4).

Regarding **claims 8, 15, 21 & 27**, in Abstract the last four lines on page 37, Tarokh et al. teaches the phase-shift keying (PSK) of the MPSK (8-PSK, 16PSK) modulation format.

Regarding claim 12, Tarokh et al. teaches the OFDM training sequence is chosen from a set of prescribed sequences (page 37 Abstract lines 1-5) and it is well known in the art that the prescribed sequences for wireless OFDM are Gold sequences so that the selected training sequence has a very low cross-correlation with neighboring base stations in the noisy and prone to inter symbol interference wireless channel (as taught by the Description of the Prior Art of the current application).

Regarding **claims 13 & 25**, page 39 left column lines 9-13, Tarokh et al. teaches the training sequences comprising a sequence of complex numbers representing the phase shift of the to be modulated and transmitted waveforms (page 38 right column lines 1-6 wherein the j is the complex number, and $\Re(x)$ is the real part).

Regarding **claims 14, 20 & 26**, in FIG.1 and page 39 the left column lines 9-13, Tarokh et al. teaches the first sequence c_i (the original sequence) is multiplies (increased/rotated the phase shift of the complex number representing the sequences) by a second sequence $\exp(j\phi_i)$ (as the modifying sequence from TABLE II/III pages 43) to form a output of Phase Shift (as a modified sequence).

Regarding **claim 19**, in page 38 the section II lines 2-4 & the equation (1), Tarokh et al. teaches the c sequence (the original training sequence) constellated in to symbols comprising complex numbers represented in the complex plane (the constellation plane) as vectors.

Regarding **claims 31-33**, in Fig.2 and page 39 the left column lines 9-13, Tarokh et al. teaches a modified training sequence produced by multiplying the training sequences c_i and $\exp(j\phi_i)$ generated by Phase Shift. The training sequence has the properties of low (less a threshold) autocorrelation and cross-correlation.

Regarding **claims 34-36 & 37-39**, in FIG.2, Tarokh et al. teaches the sequences stored in storages of the receiver (blocks de-Max, IDFT, Phase Shift, Parallel to Serial and Decoder). The c_i is the original training sequence and the $\exp(j\phi_i)$ (TABLE II/III page 43) sequence is the corresponding modifying sequence. The original training sequence and the generated modified training sequence by multiplying c_i and $\exp(j\phi_i)$ have the properties of low (less a threshold) autocorrelation and cross-correlation.

Regarding **claims 40-42**, in FIG.2, Tarokh et al. teaches transmitting the modified training sequence from Phase Shift via the Channel to the receiver (blocks de-Max, IDFT, Phase Shift, Parallel to Serial and Decoder) wherein the training sequences have the properties of low (less a threshold) autocorrelation and cross-correlation.

Regarding **claim 43**, In Fig.2, Tarokh et al. teaches a method of developing a modified wireless OFDM transmitted sequences (including training sequences) for reducing of the Peak-to-Average Power Ratio in multicarrier Communication (page 37 left column, lines 1-3 of section I. & the last paragraph of the left column to the right column line 7). In Fig.2 and equation (1) on page 38, the OFDM sequence is *selected* ($S(c,t)$ is the transmitted original training sequence selected corresponding to the code word c , page 38 right column lines 1-2), and modified by the corresponding Phase Shift (Fig.2, page 39 left column lines 9-20) wherein some Phase Shift sequences are shown on page 43 TABLE II/III (the Phase Shifts sequences are corresponding modifying sequences) to generate/*form* a modified sequence inputted to the Channel to transmit. It is well known that the wireless OFDM sequence for training the receiver having the properties of low (less a threshold) autocorrelation and cross-correlation (desired properties) for multicarrier RF communication.

In Fig.2 and page 38 left column lines 21-24, Tarokh et al. provides the software (such as DFT, IDFT, and algorithm) to implement the method. It is well known in the art that the software of processing the wireless transmitter/receiver functions is stored in a computer readable medium executed by a processor to implement the method of encoding/decoding, DFT/IDFT, etc..

Allowable Subject Matter

11. Claims 9-11 and 22-24 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims and overcome the objections set forth in this Office action.

12. Claims 16-18 and 28-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and overcome the objections set forth in this Office action.

13. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record fails to teach or suggest, alone or in a combination, among other things, at least a method as a whole, the combination of elements and features, which includes a corresponding modifying sequence comprising pairs of equal complex numbers, equal phase shift, equal rotations, or equal angles, such that each pair is the previous pair, multiplied by $\exp(j2\pi/M)$, added in magnitude by $2\pi/M$ radians or rotated by $2\pi/M$ radians, that a modified sequence is formed by modifying an original training sequence based on the corresponding modifying sequence.

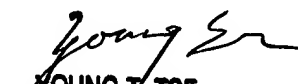
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14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edith M Chang whose telephone number is 571-272-3041. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jayanti Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Edith Chang
April 8, 2005


YOUNG T. TSE
PRIMARY EXAMINER